ST880 Cable Fault Locator

User Manual

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Chapter1 General

1.1 General information

ST880 =TDR + Bridge

ST880=Automatic Detection + Manual Detection

ST880 Cable Fault Locator is the latest test instrument developed by Senter Corporation, its working principle is Time Domain Reflectometer (TDR) and Bridge Methods. It is a very convenient, intelligent and reliable instrument for precisely locating cable faults, like open circuit, short circuit, cross faults, poor insulation and balance test, etc. We can also transfer the fault data to PC via cable or Flash Disk.

1.2 Features

- ST880 combines the conventional TDR method and Bridge Method for fault detecting, faults like open circuit, short circuit, poor insulation can be detected.
- Multimeter function: it can be used to detect isolation resistance and loop.
- Automatic Detection: advance and precise, it can find almost all types of faults.
- Manual Detection: easy to detect, it matches with automatic detection to give the operation a very precise result.
- Waveform Storage: ST880 can store 20 waveforms together with the fault time permanently, it will not be lost even the instrument is powered off.
- Wavelet detection: technology used for long distance fault detection, this can increase the detection range and accuracy.
- Data transfer: the operator can transfer the data in the ST880 to PC with a

Flash Disk. The software installed in the PC can analyze the waveforms, establish database for the waveforms, and print if necessary.

- Friendly Human-Machine Interface(HMI), easy to use.
- Internal recharging Li-Ioh battery, long life span and short charging time.
- Small in dimension, and light in weight, easy to carry bag.

1.3 Specifications

RANGE:	0 to 8000m
ERROR: (VOP is 200m/μs)	Max. 1 m ≤2000m Max. 8m≥ 2000m
VELOCITY:	100 to 300 m/μs (default 201 m/μs)
GAIN:	0-80dB
TDR PARAMETER:	
Amplitude:	Single 30V, Double ±30V
Width:	160ns to 3.5μs Automatically set according to ranges
Balance control:	Range 82 to 600 Ohms
Blind Area:	2m
DISPLAY Type:	High resolution LCD (320*240 pixel) with backlight
BRIDGE PARAMETER:	
Poor Insulation Range Detected:	0-30MΩ
Test Voltage:	100V
TEST MODE:	Balance, Differential, Bridge
POWER:	Two Li-Ion cells, 5 hours for continuous use, 5 minutes auto

	power off after last key operation.
CHARGING TIME:	<3 hours (automatically)
CHINGER POWER:	Input: 220V/50Hz AC
	Output: 8.4V DC

ENVIRONMENTAL:

Operating temperature:	-5□ to +40□
Storage temperature:	-10□ to +40□
Humidity:	(20-90)%RH at 25□

Table 1 ST880 Specifications

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1.4 ST880 Layout and Appearance

1.4.1 The Instrument includes:

- Main Unit
- One Test Cable
- Charger
- One CD, PC software for data transfer
- Bag

1.4.2 Front Panel

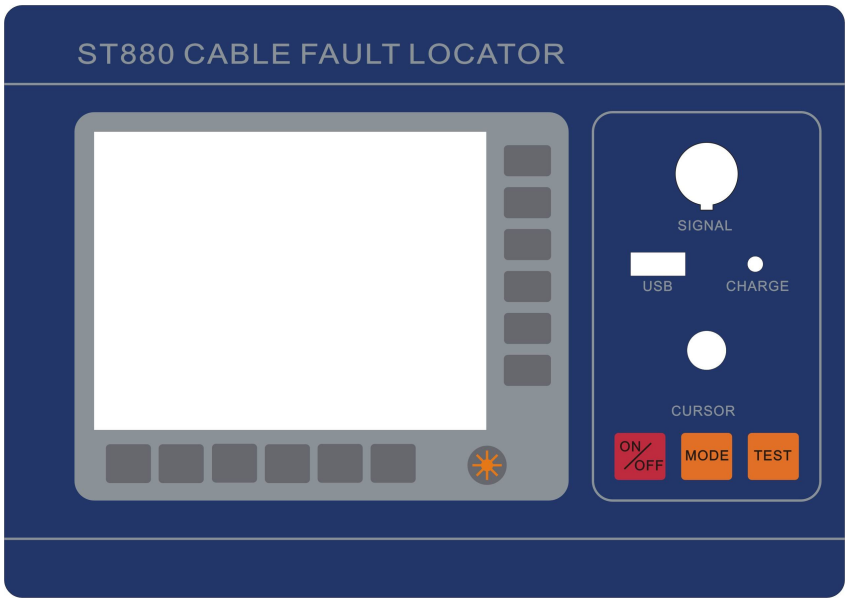

Fig. 1.1 ST880 Front Panel

Ⓐ. Display area(LCD): to display the waveform and all messages.

Ⓑ. Function Buttons: there are many buttons on the below and right sides of the LCD, see what displayed correspondingly on LCD, it will perform that function.

C. : To switch on and off the LCD backlight.

D. **SIGNAL: T**he test cable is plugged here.

E.USB: to use Flash Disk to transfer waveform.

F. **CHARGE:** Charge the instrument

G. CURSOR: to move the cursor right/left, to determine the fault location.

H.

: to switch on and off the instrument.

I.

: to convert different test mode.

J.

: Press once for single test, press this button more than 2 seconds, it will be converted to automatic test.

1.5 Operation

The instrument interface is easy and friendly to use, the operation is just like the ATM machine from the bank.

There are 12 blank keys around the LCD, 6 at the bottom and 6 at the right. If the ST880 is powered on, the function of the keys will correspond to the nearest displayed function.

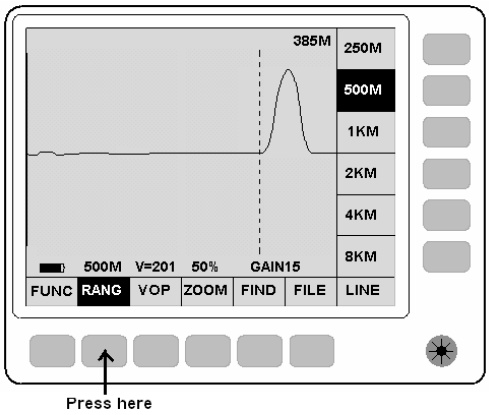

Fig. 1.3

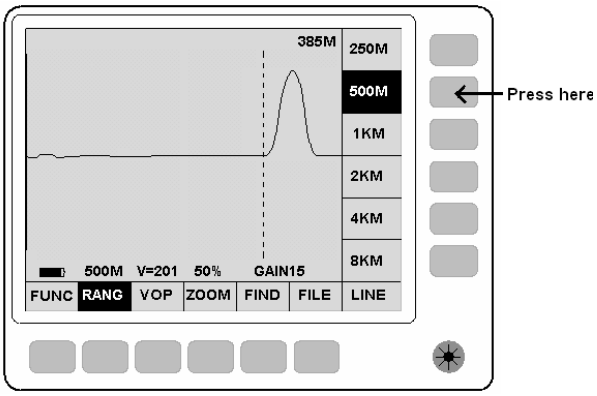

Fig. 1.4

For example, if we power on the ST880, there will have the following functions displayed at the bottom of the LCD, they are FUNC, RANG, VOP, ZOOM, FIND, FILE, LINE, press RANG as Fig. 1.3 shows, then the right part of the LCD will display 250M, 500M, 1KM, 2KM, 4KM and 8KM. Press 500M as Fig. 1.4 shows, then the test range will be 500 meters.

Setting

Press

key to turn on the ST880, the welcome and time information will be displayed, then press SET, the ST880 will be entering the setting display, as Fig. 1.5 and 1.6 shows.

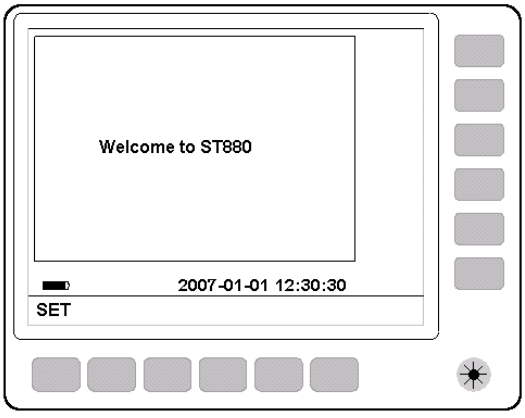

Fig. 1.5

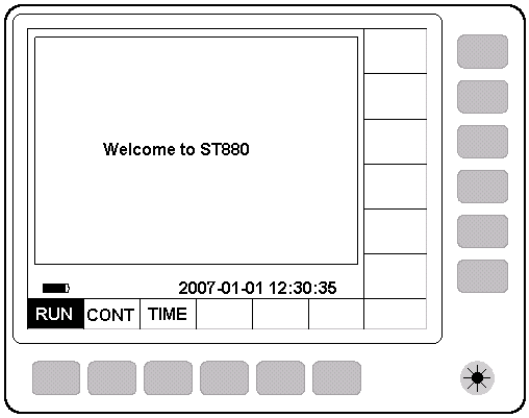

Fig. 1.6

1． **CONT (Contrast) Set:** After entering SET, press CONT, then press INC. to increase the contrast and press DEC. to decrease the contrast, as Fig. 1.7 shows.

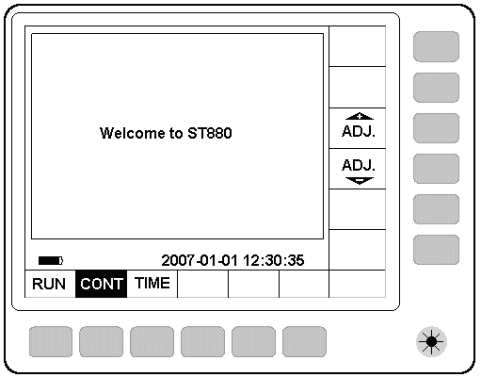

Fig. 1.7

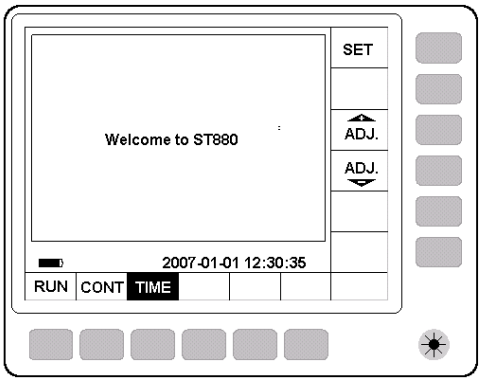

Fig. 1.8

2． **TIME Set**：After entering SET, press TIME, then choose SET on the right, choose the time you want to set, then press INC. or DEC. to adjust the time. As Fig. 1.8 shows.

After all these are done, the ST880 will save the setting and memorize it, the operator doesn't need to set it again.

The detailed setting and operation will be introduced later in this manual.

1.6 The Procedures for Detection

1.6.1 The judgment of the fault

Based on the ST880, the telecom cable faults can be categorized to the following kinds:

1) Open Circuit: one conductor or a few conductors are broken, the communication is impossible. For this kind of cable fault, we can use TDR method (Pulse Reflection) for location.
2) Low resistance cross fault: for this type of fault, it can be categorized into three type, conductor earthing, one pair cross and different pairs. Under this condition, the isolation impedance will drop tremendously to very low level, maybe a few hundred or thousand. This will influence the communication, or sometimes impossible. For this kind of fault, we can use TDR method to detect the faults. If the waveform is difficult to judge, we can also use BRIDGE method to detect.
3) Poor Isolation: the isolation material of the conductors of the cable is facing water or humidity, this will lower the isolation resistance, and makes poor communication quality, maybe impossible. For this kind of fault, it is similar to 2) fault, but with higher fault resistance (a few thousand Ohm to 30M Ohm), this kind of fault is not very serious. We can not use TDR method to detect, but BRIDGE method.

After the cable faults, we should use MegaOhm meter, mutimeter to tell the fault type and fault degree, so that we can choose proper detecting method. We should also consider the following conditions, like the time, range, the environment, the weather condition, and any other factors. Only this way, we can roughly judge the fault type and what method we can use.

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1.6.2 Choosing proper detection method

If the fault resistance is a few hundred to a few thousand Ohm, it is called Low Resistance Fault; if the fault resistance is very high, it is called High Resistance Fault. But please be noted that there is no clear limit for these two kinds of faults.

TDR method is suitable to detect Open circuit and Low Resistance Cross fault, but for some serious poor isolation faults, like water in cable, this method can also be applied. We should choose this method with priority, because it is easy to detect and easy to analyze the waveform, simple in operation.

For BRIDGE method, we can use it to detect Poor Isolation faults, but since we must have one healthy pair and the far-end cooperation is must, the preparation work is very complicated, the operator can only choose it after you really can not get any helpful result using TDR Method.

Note: when use TDR method, the testing cable is different for different method, we should press MODE to convert between different modes.

1.6.3 Fault distance Detection

Use ST880 can detect fault distance precisely, we should disconnect the faulty pair of cable from other equipments connected.

Warning:

The T-C800 can not withstand voltage over 400V, for the safety of operator and equipments, we should discharge the cable under tested completely.

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1.6.4 Pinpointing of the fault

According to the fault distance detected, with the reference of the drawing to determine the fault location. Maybe sometimes the file is not complete, we can estimate the rough location of fault according to the information we gathered. Example, if there is any joints within the fault distance range, we can tell that the fault point is at the joint location.

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Chapter 2 Pulse Reflection (TDR) Detection

TDR method is suitable to detect Open Circuit and Low Resistance Cross Fault.

2.1 Working Principle

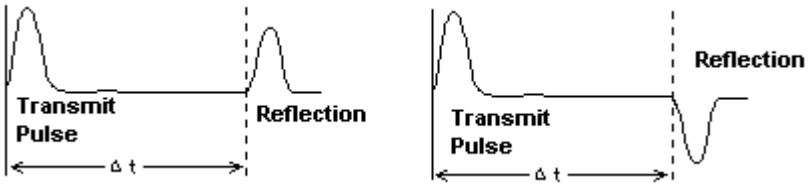
Electrical pulses are transmitted into the cable, and a portion of the pulse energy will be reflected back to the instrument from cable discontinuities or faults. The fault characteristic impedance Zi will be different from the cable characteristic impedance Zc, the reflection coefficient is:

$$\rho = (Zi-Zc) /(Zi+Zc) \qquad (1)$$

The reflection pulse voltage is:

$$Un=\rho Ui=[(Zi-Zc)/(Zi+Zc)]Ui \qquad (2)$$

From the equation (1), when the cable has Open Circuit fault, $Zi \rightarrow \infty$, $\rho=1$, then the reflection pulse is positive, see Fig. 2.1-A. While the cable has Short Circuit fault, $Zi \rightarrow 0$, $\rho=-1$, the reflection pulse is negative, see Fig.2.1-B. Under normal condition, the fault is usually poor isolation, the absolute value of reflection coefficient is less than 1.



A: Open Circuit Fault Waveform B: Short Circuit Fault Waveform

Fig. 2.1

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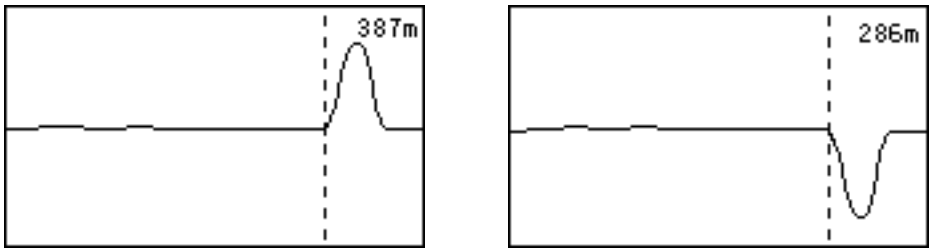
2.2 Concepts

Waveform: We can know the cable condition through the waveform displayed using TDR method, so it is key factor to understand the waveform if we use TDR method. Waveform for Open Circuit fault is upward, while the Short Circuit waveform is downward.



A: Open Circuit Fault Waveform B: Short Circuit Fault Waveform

Fig. 2.2

Fault Distance: The start position of reflection waveform is fault location. Move the cursor to the pulse waveform start, that is the position of there is great change (as Fig. 2.2 the dotted-line shows), the number displayed on the screen is the fault distance. If the curor is at other location, the value displayed has no sense. For Automatic Test, the instrument can set the fault distance automatically, but sometimes it need to correct manually if necessary.

Test Range：For choosing range, it is very important, we can only detect the cable within the range. If the cable we are testing is beyond the range we have chosen, then the condtion of the beyond part will not display, we will know nothing about it. So when we choose the test range, it should longer than the total length of the cable, maybe 30% more. For example, we know the total length of the cable detected is 1500m, then we choose 2000m range is correct. If the cable length is 950m, we can not choose 1000m range, 2000m range is better.

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VOP(velocity of propagation) : From the above parts, we can see that to detect distance is in fact detecting time. Pulse velocity times transmitting time is distance, so we must know the precise transmitting velocity first. The VOP differs from different conductor isolation material, and has nothing to do with the conductor diameter. For example, the VOP of plastic cable is 200000Km/s, or 200m/μs. We have saved some normally used material VOP in the instrument, the operator can choose from the list for the VOP, see Tab. 2

No.	Isolation Material for Cable	VOP (m/μs)
1	Air isolation	294
2	Foamed Polyethylene	246
4	Polytetrafluoroethylene(Teflon)	213
5	Polyethylene	201
6	Filled Polyethylene	192
7	Paper Pulp	216
8	Paper	264
9	Cross Linked Polyethylene	156-174
10	Oil paper	150-168
11	Polymer	168-186

Tab. 2 VOP for Different Isolation Material

The same type of cable may have different VOP for it is from different manufacturer, if we want to know the exact VOP of some cable, we should do the calibration, please find details from 2.8 for calibration method.

Gain: the gain can adjust the waveform amplitude displayed on LCD, it is usually adjusted to the level suitable to view but without distortion. For automatic test, Gain is adjusted automatically; while for manual test, it is adjusted manually.

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Balance: there is to match impedance to eliminate the effect of transmitting pulse to receiving signal, and make the reflection pulse more obvious. For automatic test, BALANCE is adjusted automatically; while for manual test, it is adjusted manually.

BALANCE & Differential Methods: for Balance method, it only connects the faulty conductor pair, all points that not match will be displayed from waveform, including the faulty point and joints. So if the fault is not obvious, it is difficult to tell the waveform difference of faulty point and joint. Then now we can use Differential method to test, that is, connect one good pair and one faulty pair to the instrument, then the different point of these two pairs will be displayed, it is easier to tell the faulty waveform. For Differential method, it is not necessary to adjust the balance.

For real fault detection, we can use Balance Method first, if it is difficult to analyze the waveform, we can use Differential Method.

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2.3 Wavelet Method Detection

Wavelet method is used for long distance fault detection.

Comparison after using Wavelet Method.

Fig. 2.3 shows the waveforms with and without using Wavelet Method. The solid line is waveform after using Wavelet Technology, while dash line is using conventional TDR technology. We can see from the comparison that the fault waveform is much obvious for Wavelet than TDR.

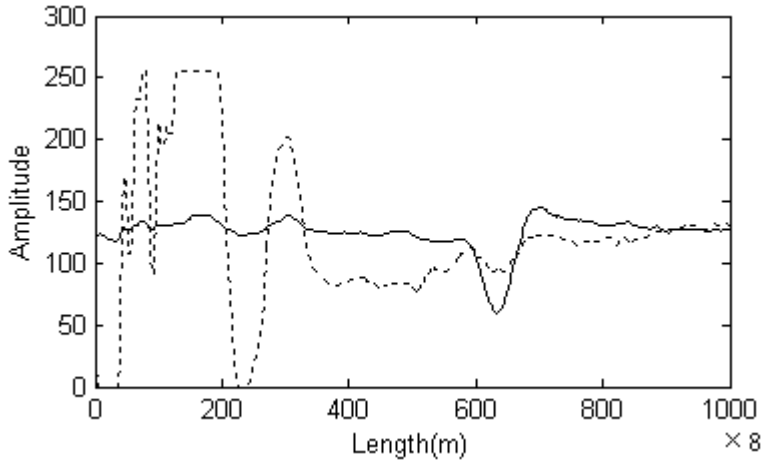

Fig. 2.3 Waveform comparison for TDR and Wavelet Methods

Working Method for Wavelet Test

Start: under FUNC menu, press W-let button to enter the wavelet test method.

There will have display after entering this method on the right upper location of LCD.

Stop: to quit the Wavelet method has three ways: first one is to press W-let button again; second method is to choose the range except 4Km and 8Km under RANG menu; the third one is to press TEST button for a while it will convert to Automatic Test, then it quits the Wavelet method. After quitting this

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method, this will disappear.

Application: it is only used for the long distance (>2Km) detection, when we choose this method, the default range is at 8Km. If the operator wants to set the range at 4Km, you can just do it.

Operation: this method can only support manual test. Under Wavelet method, press TEST button to the detection. We can press or button to adjust the Gain for suitable waveform. But Gain should not be too big.

2.4 TDR method

Press key to power on ST880, the first show is welcome interface and the current time (at this time can be adjusted, adjustment methods please see this chapter I.5 Setting.), then enter into TDR test method. It is as Fig. 2.4 shows.

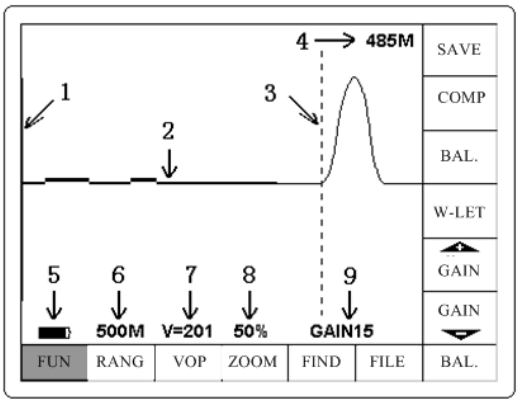

Fig. 2.4

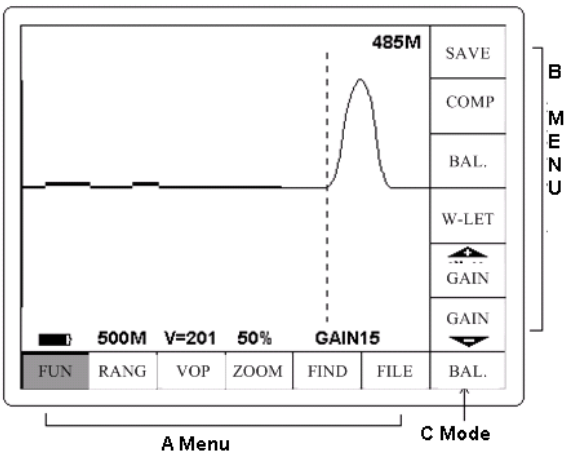

Fig. 2.5

In Fig. 2.4, 1 is solid cursor; 2 is waveform; 3 is dash cursor; 4 is the distance

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between the solid cursor and dash cursor; 5 is the battery indicator; 6 is the current test range; 7 is the current VOP; 8 is the current display rate; 9 is the current gain.

In Fig. 2.5, A Menu area is all menus for the ST880, B Menu area is all menus highlighted menu in A Menu area. C Mode is the testing mode now in use, Balance, Differential, or Bridge.

Mode Conversion

Press Mode button, it will display as Fig. 2.6 shows. Then press BAL (Balance), Diff (Differential) or BRID(Bridge), to choose one method. We will introduce the BRIDGE method in Chapter 3.

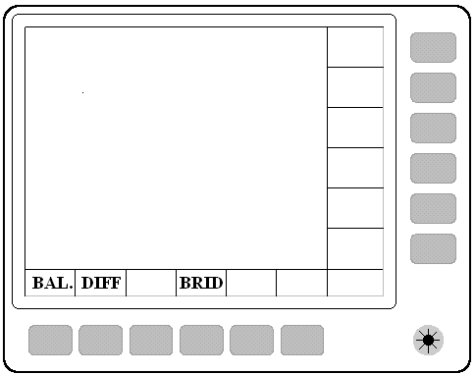

Fig. 2.6

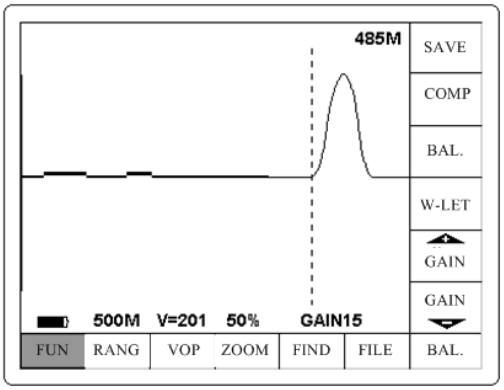

Fig. 2.7

Here, we will introduce the functions for each menu.

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2.4.1 FUNC (Function)

For basic control function, they are used under Manual Test. Press FUNC, it will display as Fig. 2.7 shows.

·SAVE: to memorize the current displayed waveform, for comparison use.

·COMP: to compare the current waveform with saved one. If it is comparison for faulty pair and healthy pair, the position with great difference will be the fault point. See Fig. 2.20.

·BAL.: if the range is 250m, press BAL. to balance automatically, this makes the waveform much easier to tell.

·W-let: press one time, to enter into the Wavelet testing method. There will have displayed, as Fig. 2.8 shows. Press it again, it will quit this detection method.

. or : to adjust the gain.

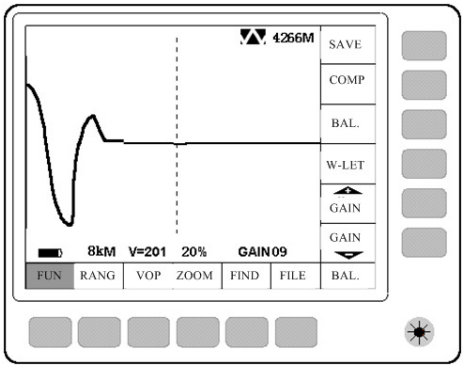

Fig. 2.8

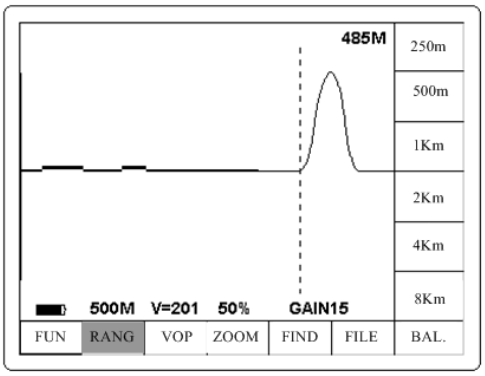

Fig. 2.9

2.4.2 RANG (Range)

Press RANG, there will display 250M, 500M, 1KM, 2KM, 4KM and 8KM at the right part of LCD, as Fig. 2.9 shows.

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2.4.3 VOP (velocity of propagation)

It is used to choose suitable vop according to different cable type, the display is as Fig. 2.10 shows.

·201：plastic cable 201m/μs。

·192：Filled Polyethylene cable 192m/μs。

·160：Oil Cable 160m/μs。

·216：Paper Pulp cable 216m/μs。

·· VOP or VOP: the default VOP is 201, to use this to choose the right VOP. If the cable VOP is not in the list, just use these two to adjust.

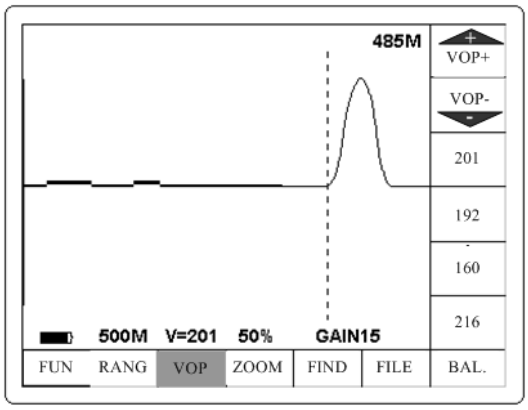

Fig. 2.10

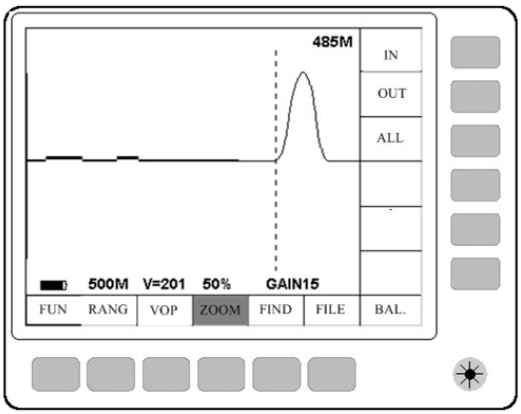

Fig. 2.11

2.4.4 ZOOM

This is used to change the waveform display rate horizontally. Press this button, the LCD display will be as Fig. 2.11 shows, the waveform can be zoomed in, zoomed out or reset.

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2.4.5 FIND

After the test is finished, this is used to find the fault location, also this menu can quit Wavelet Method, Fig. 2.12 shows details.

·LOCA(locate): under such mode, use this menu to relocate the cursor to the suspected fault location.

·ZERO: press once, there will have a solid line appear at the location of dash line, and this is the zero point of the coordinate. If there is a joint near the fault location and there will have reflection, set the joint point as zero, move the dash line to the fault point, this way we can tell the distance between joint and fault point.

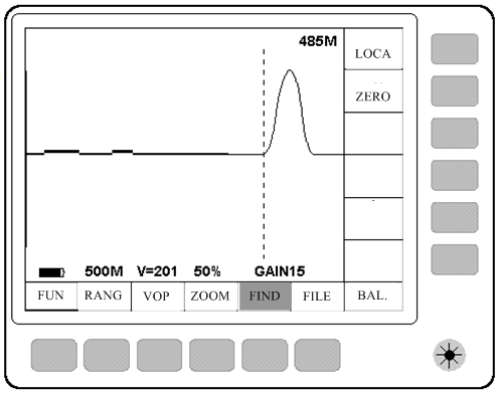

Fig. 2.12

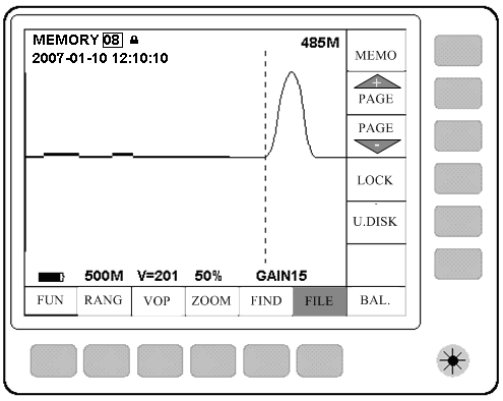

Fig. 2.13

2.4.6 FILE

To manage the waveforms, as Fig. 13 show, please find details in 2.8.

2.5 Connection

2.5.1 Test Lead, plug the test lead to SIGNAL.

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2.5.2 BALANCE mode connection：pair fault, use red clips of BALANCE test lead to clip the two conductors of the pair, as Fig. 2.14 shows. For Earthing fault, clip the earthing conductor and ground, as Fig. 2.15 shows.

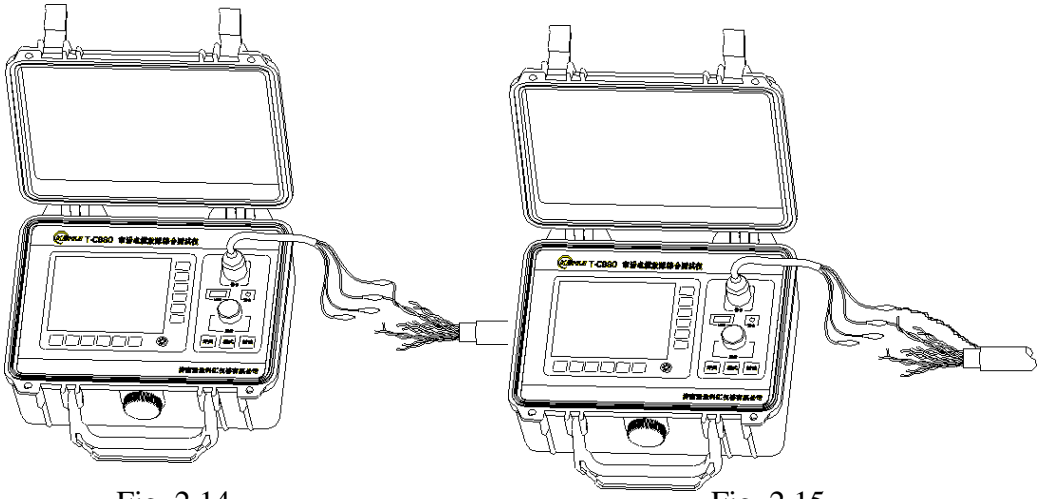

Fig. 2.14 Fig. 2.15

5．Differential Method connection: the red clips of BALANCE test lead clamps the faulty pair, the black clips of DIFFERENTIAL test lead clamps the healthy pair, as Fig. 2.16 shows.

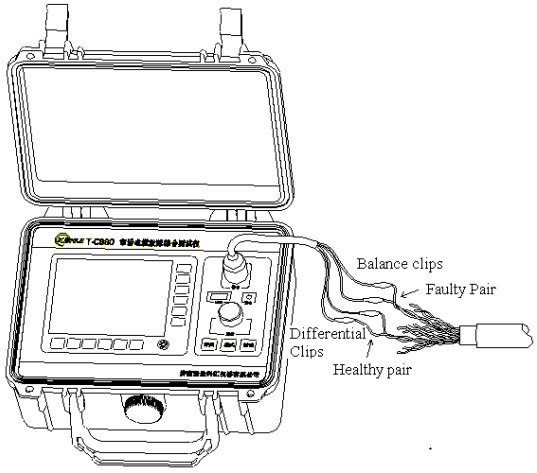

Fig. 2.16

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2.6 Automatic Test

We can use Automatic Test first, if the fault is complicated, and gives no satisfactory result, we can use Manual Test.

Press TEST button for more than 2 seconds, it will enter into Automatic Test, and gives fault waveform, it is as Fig. 2.17 shows.

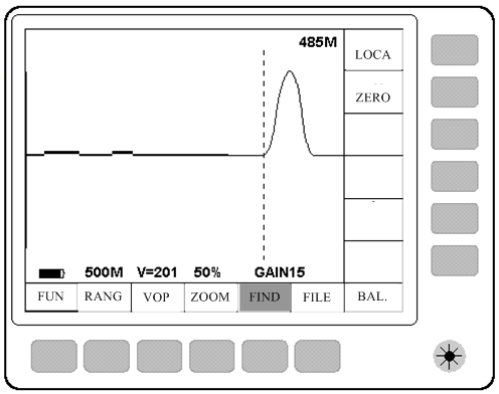

Fig. 2.17

2.7 Manual Test

If the fault or cable condition is complicated, then we need to use Manual Test.

2.7.1 Select Range: it should be longer than the total cable length, better have 30% more.

2.7.**2 Adjust VOP with different cable type:** adjust the vop with reference to the Table 2.

2.7.3 Test : press TEST once, the waveform will be displayed on the LCD. Move the cursor to the start point of the reflection pulse, the distance value appeared on the upper right location is the fault distance. If it is hard to

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view the reflection pulse, adjust RANGE to redo the test.

2.7.4 . Gain adjustment : if the waveform amplitude is too big or small, the operator can adjust it with GAIN or GAIN under FUNC menu, press GAIN or GAIN to increase or decrease the gain, the instrument will display waveform accordingly.

2.7.**5 BALANCE:** if the range is 250m, press BAL. to balance automatically, this makes the waveform much easier to tell.

2.7.6 Waveform Memory and Comparison: If you are not sure about the fault distance detected, just press SAVE under FUNC menu to memorize the waveform; then test one healthy pair without any parameter changing; then press COMP to compare the two waveforms. The point where there is great difference is fault point, but not joint point. It is as Fig. 2.18 shows, A point is fault point, while B point is joint.

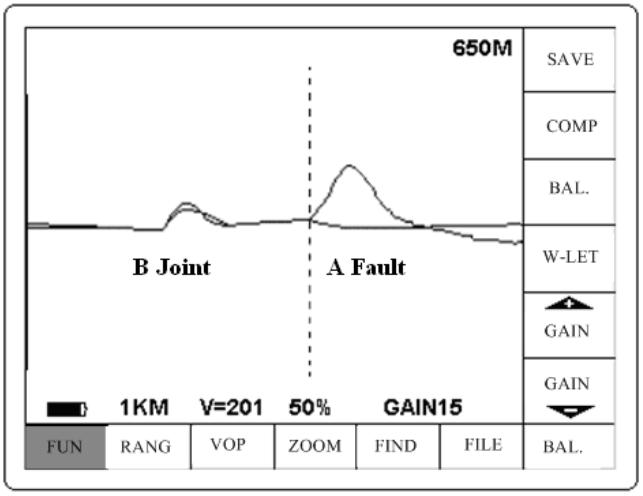

Fig. 2.18

2.7.7 . ZOOM : if you want to have a better view for the waveform, press IN under ZOOM menu, press OUT to revert, or ALL to return.

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2.7.8 <u>ZERO:</u> if there is joint near to the fault position, we can use this to determine the fault to joint distance. Press ZERO once, there will have a solid line appear at the location of dash line, and this is the zero point of the coordinate. If there is a joint near the fault location and there will have reflection, set the joint point as zero, move the dash line to the fault point, this way we can tell the distance between joint and fault point. As Fig. 2.19 shows.

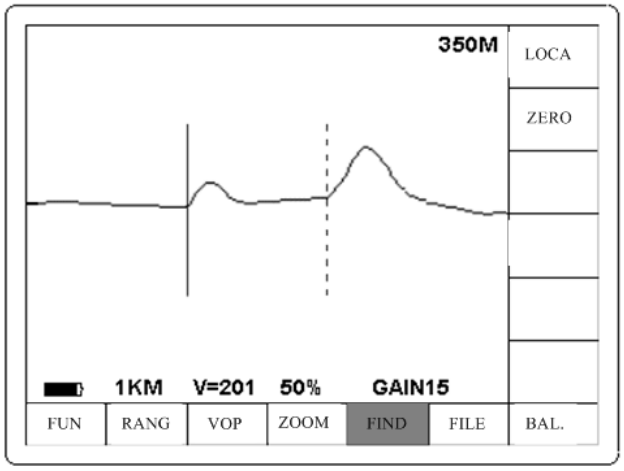

Fig. 2.19

2.8 Measurement of VOP and Calibration

If we need to test or calibrate the cable vop, we can connect the instrument with one healthy pair to detect the waveform. If the total length detected is not the same as the real length, we can press ADJ. or ADJ. under VOP menu, until the detected length is the same as real length. Then the set VOP is the real VOP of this cable, we can keep this in file for this kind of cable.

For calibration, we can save the waveform detected, then shorten the far end of this cable, compare these two waveforms, move the cursor to the position where there is difference, we can see that this is the cable length. Repeat the above operation to calibrate the VOP.

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2.9 File Management

The ST880 can save 20 waveform, they will be lost even the instrument is powered off.

2.9.1 <u>Enter into file management:</u> press FILE key, we can enter into the file management, the appearance is as Fig. 2.20 shows. The current waveform is displayed.

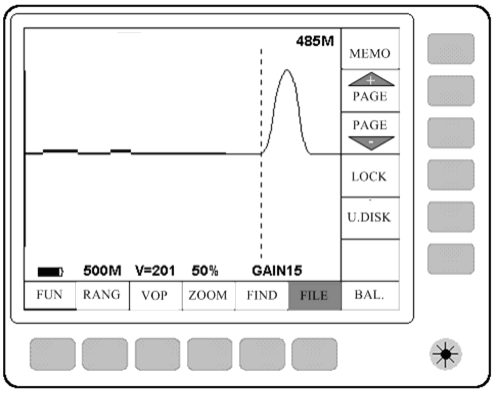

Fig. 2.20

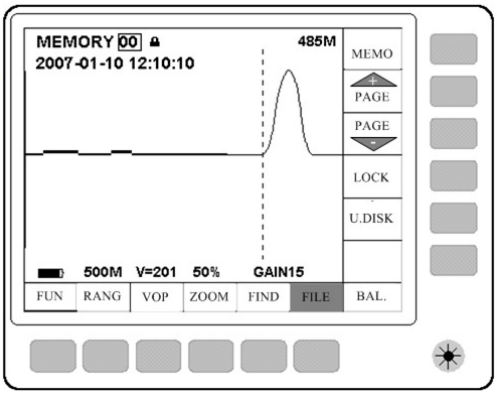

Fig. 2.21

2.9.2 <u>Save the current waveform</u> : after entering FILE, press MEMO to save the current waveform. If there already have 20 waveforms, the earliest one without being locked will be deleted.

<u>Note: if we want to save the waveform, we should do it immediately. If you review the filed waveforms first, the current waveform will be deleted, then we will have to do the test again.</u>

2.9.3 <u>Review the filed waveforms</u> : press PAGE key, it will display the waveform saved as 00, as Fig. 2.21 shows. The left corner of LCD will display MEMORY 00, here 00 is the saved serial number, shows that the waveform is locked, shows the waveform is unlocked. Press PAGE or PAGE button to review all saved waveforms.

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2.9.4 <u>Lock the saved waveform</u> : if the operator wants to save one waveform to avoid being deleted, you can press PAGE + or PAGE - to the file you want to lock, press LOCK, you can lock it. If you want to unlock it, press LOCK again at the waveform to unlock it.

2.9.5 <u>Use USB disk for data transfer:</u> plug an USB disk to USB port, press U-DISK under FILE menu, all saved waveforms will be displayed as list, as Fig. 2.22 shows, press ENTER to select the highlighted waveform, then there will have ■ appear, it shows that the current is selected. Then press SEL.+ or SEL.- to select the waveform you want to transfer, or press S-ALL to select all waveforms, or press S-ALL again to cancel the selection. After you select what you want to transfer, then press COPY to copy them to the USB disk. Press EXIT to quit this operation.

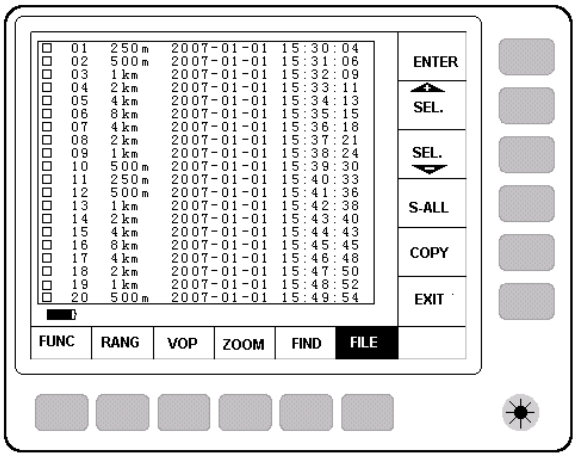

Fig. 2.22

Chapter 3 Bridge Method

The fault resistance of poor Insulation is very high, much more than the cable's surge impedance, the pulse reflection is very weak and it is difficult to judge the fault point. At this time, we should use Bridge test mode. The tester also has mega meter and ohmmeter function

3.1 Working Principle

and in unit length the resistance is the same. We assume that the resistance of the whole cable is R, if we can test the resistance between the fault point and the other terminal is Ra, and we know that the length of centre yarn is La, and then we can get the following conclusion:

$$La = (Ra/R) L$$

The centre yarn rate is changes according to the temperature and different diameters of line, but the influence is the same in the range of the cable's length. If we use Ra/R this proportion calculation method, we can remove the influence.

When testing, the testing will calculate the Ra/R automatically, and then we should input some data in order to calculate the La. If the diameter of the whole cable is the same, we need only input the cable's length (L); If the cable has many different diameters, we need input part diameters and part length of the cable (See details in the third part)

The tester adopts intelligent bridge technology, users only need to connect the line well, input the length, part diameters etc, press some keys, and then the fault point will be calculated out.

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3.2 Bridge test interface introduction

Use BRIDGE test lead to connect to the SIGNAL port, power on the ST880, press Mode, to choose BRID mode, as Fig. 3.3 shows.

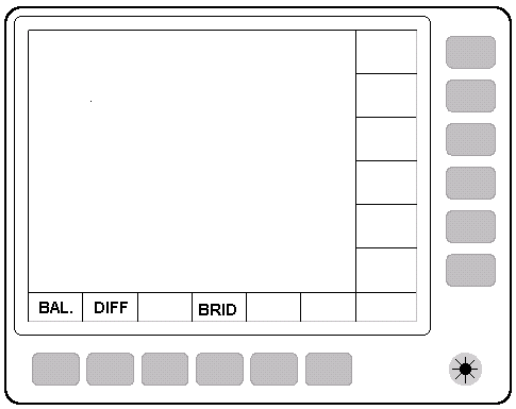

Fig. 3.3

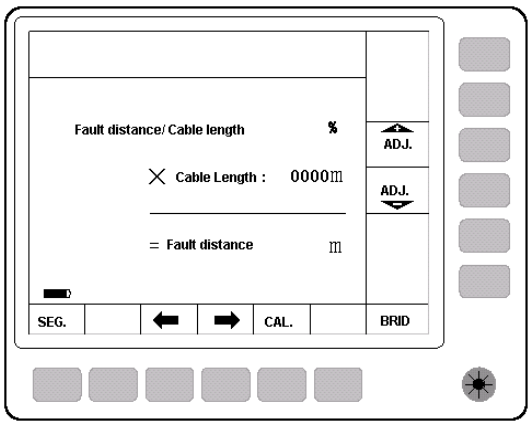

Fig. 3.4

Fault distance/cable length= %" is the proportion value tested by the instrument, the result will be displayed. While for Cable length= m needs the user to input the correct cable total length after testing. After inputing the cable length, press CAL., the fault distance will display.

During the test, the insulation resistance and the loop resistance will be displayed in the up of the screen.

The menu below the LCD are SEG., ⬅, ➡, these are used to inputcable length, we will introduce later in this chpter.

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3.3 Multimeter function

Bridge test can also have 100V Megaohm and Ohm meter function, it can be used to test isolation resistance and loop resistance.

3.3.1 MegaOhm Meter function

Any red and black one of the test lead can be used for this function. For example, the user wants to test the insulation resistance between one conductor to ground, the RED 1 connect the conductor, the black one connects with the ground, as Fig. 3.5 shows. Press TEST, the screen will display the test result in a short while.

Assume the insulation resistance is 1.2 MΩ, red crocodile chip clamp red guide line, and displays "Red 1-Black 1.2M, Red 2-Black ∞ No loop". If use RED 2 and Black clip, it will display "Red 1-Black ∞, Red 2-Black 1.2M No loop".

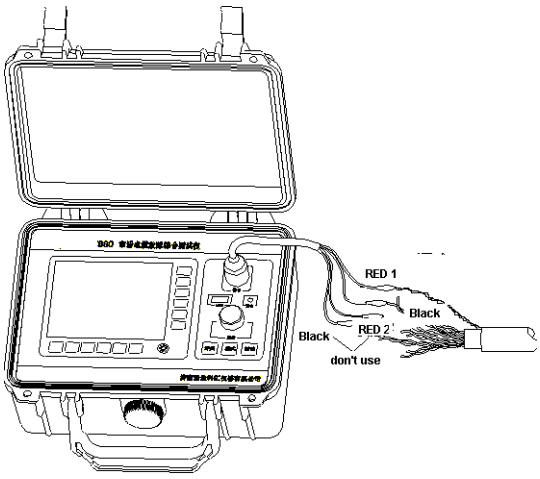

Fig. 3.5 MegaOhm Meter Connection

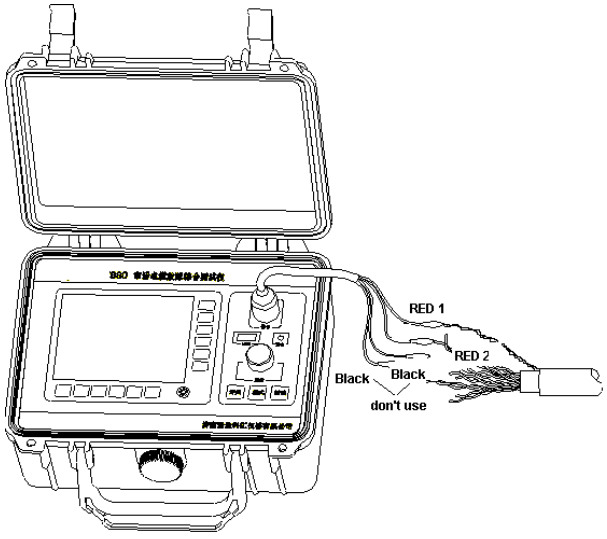

Fig. 3.6 Ohm Meter Connection

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3.3.2 Ohm Meter Function

RED 1 and RED 2 test lead can be used to have Ohm Meter function, the connection is as Fig. 3.6 shows.

3.4 Connection Method for Bridge method

We will the poor isolation for line to earth:

3.4.1 Determine the fault area: the two ends are called near end and far end, the near end will connect the instrument.

3.4.2 Find one line with relatively low resistance from all faulty lines as line under tested, open it with any other equipments or lines.

3.4.3 Then find one well isolated line as assistant, open it with all other equipments of lines at both ends. **The resistance to ground of healthy line should be much higher faulty line, the higher the better.**

3.4.4 Shorten the healthy line with the faulty line.

3.4.5 Plug the test lead into SIGNAL socket, RED 1 clip clamps to Healthy Line, and RED 2 to faulty line, any B clamps to ground. The detailed connection is as Fig. 3.7 shows.

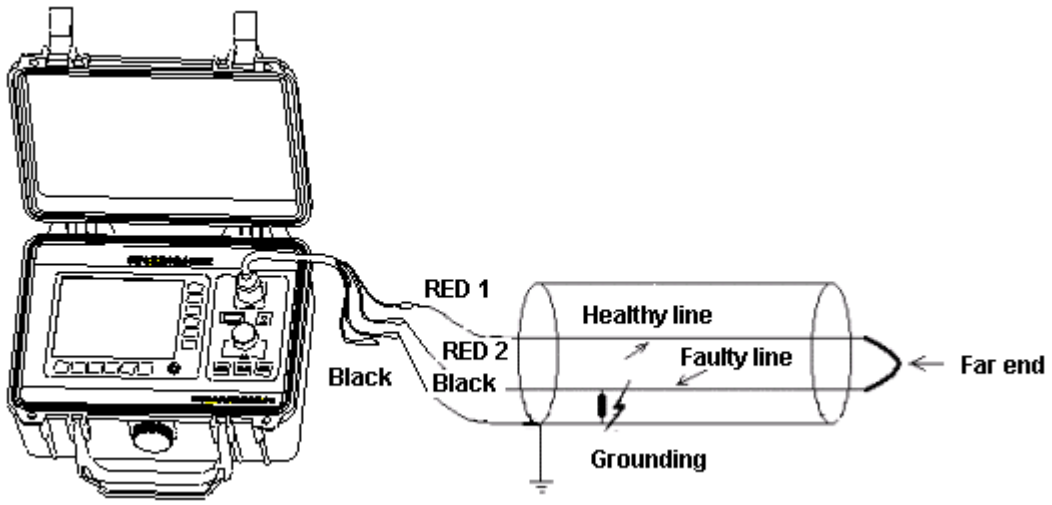

Fig. 3.7 Connection for Grounding Fault

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3.4.6 Cross fault connection is similar to grounding fault, but the black clip is different, as Fig. 3.9 and 3.9 shows.

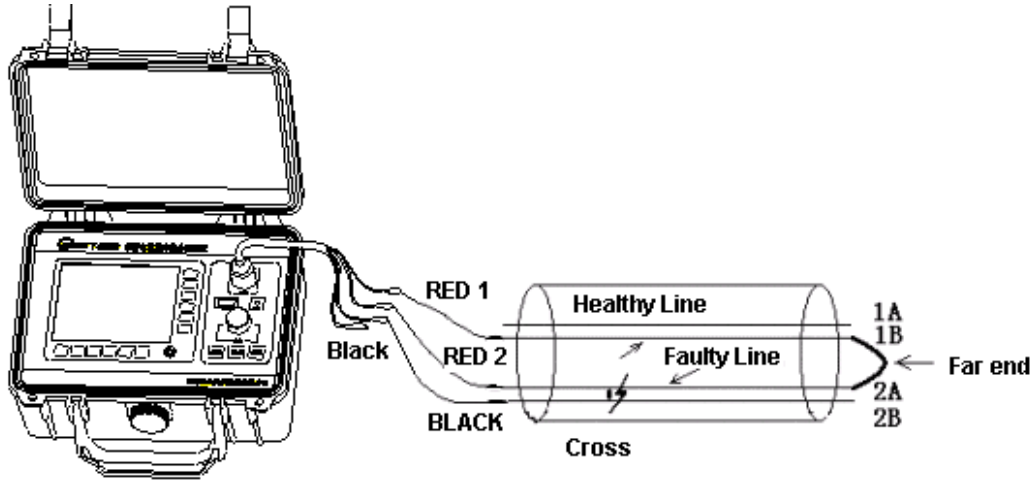

Fig 3.8 Cross Between pair Fault Connection

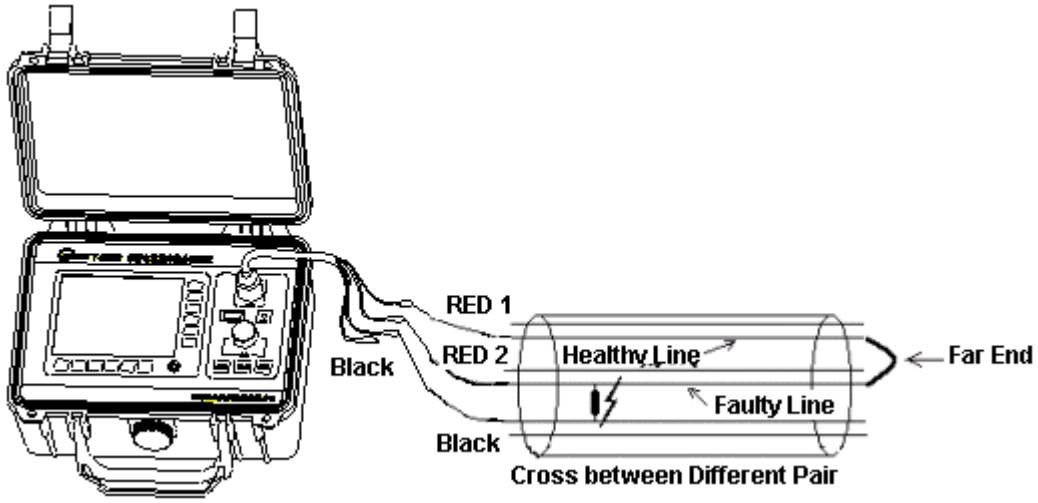

Fig. 3.9 Cross between Different apair fault Connection

3.4.7 It is really important for the connection, please pay attention, RED 1 and RED 2 should correspond to the loop at far end.

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3.5 Bridge Method Test Procedure

Be careful with the connection before test.

Press TEST, then it will display Please Wait…, the instrument will measure the isolation resistance and loop resistance and display the result on the top. It is as Fig. 3.10 shows.

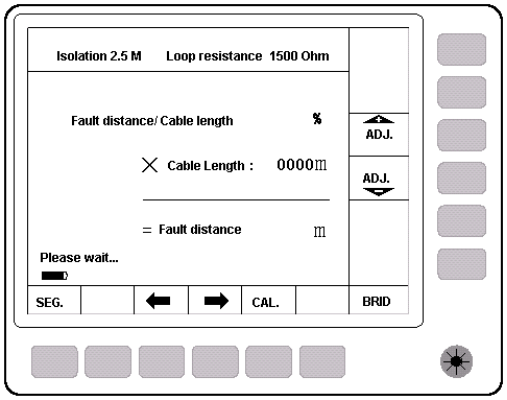

Fig. 3.10

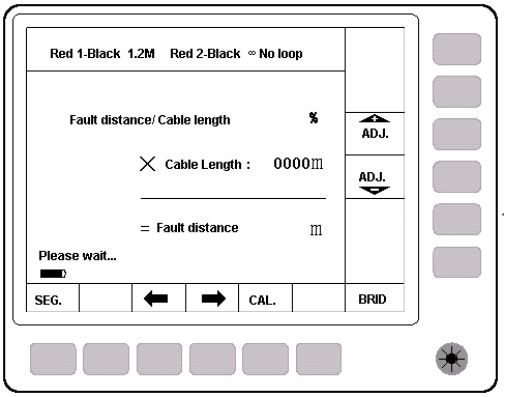

Fig. 3.11

If the far end is not shortened, it will display as Fig. 3.11 shows with no loop appear. Please check the connection and test again.

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If the connection is correct, we will get the detection result displayed as Fig. 3.12 shows. This needs around 1 minute.

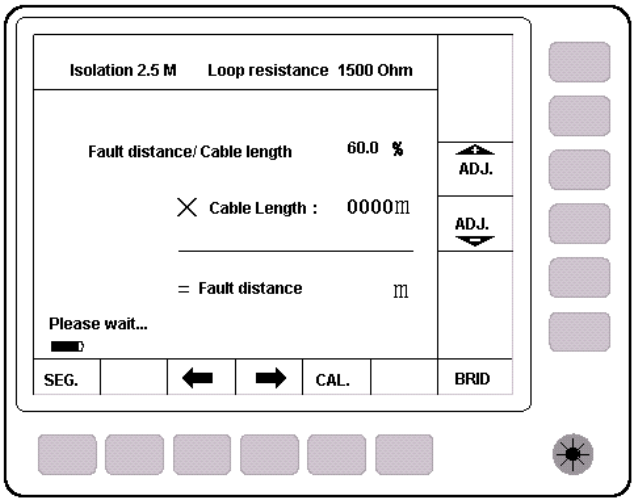

Fig. 3.12

3.6 Input the total length, to calculate the fault distance

3.6.1 Know the cable length：

If you want to get the cable length, there are two methods:

One is to get the drawings and know the cable length.

Two is use TDR method to have the total length.

Please be noted that the input method if different for segmented and non-segmented cable.

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3.6.2 Input method for cable non-segmented

If it diplay as Cable Length=0000m, the underlined number is blinking, take 1580m as example, press ADJ. , it will be Cable Length =1000m, then press ➡ to the second number, press ADJ. five times, it will be 1500m; then press ➡, and press ADJ. eight times, now the Cable Length =1580m. After input the number, press CAL to calculate, the result will be displayed as Fig. 3.13 shows.

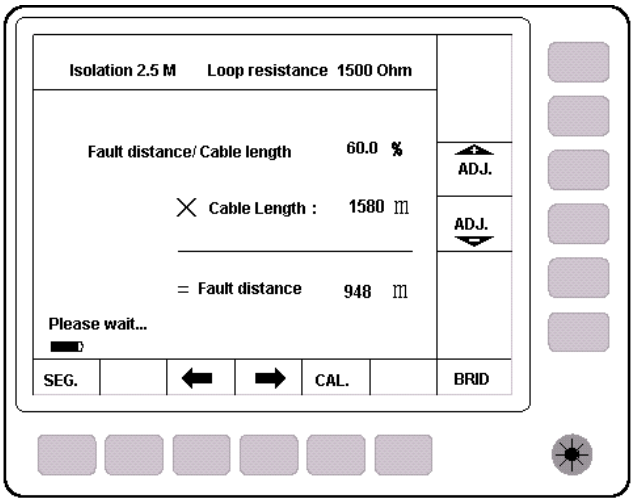

Fig. 3.13

3.6.3 Input method for segmented cable

Under some condition, the cable detected consists of different diameter lines, then we need have different cable length method, or the result will be not correct.

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Press SEG., there will have a table display on the LCD, as Fig .14 shows. The sequence is from far to near for the segmentation, if there is only two, the 3 part should all be 0.

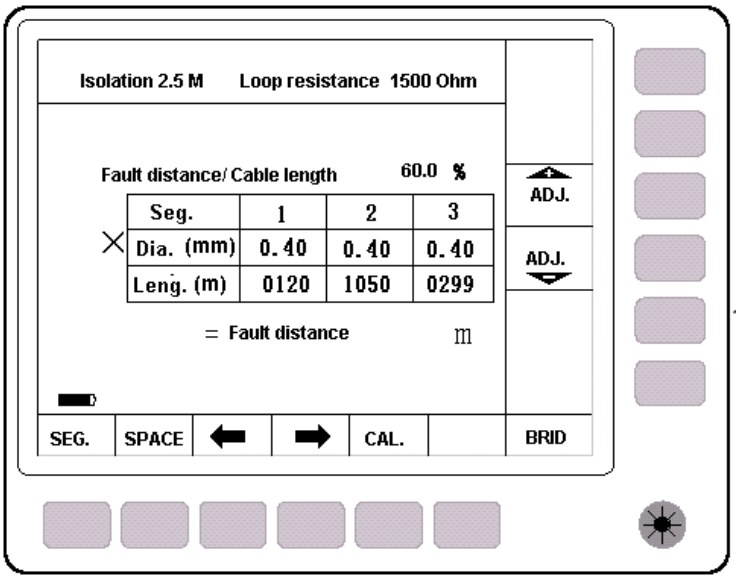

Fig. 3.14

Use ADJ., ADJ., ⬅ and ➡ to input the number, if it need to enter next column, just use SPACE. After inputing all numbers, press CAL. to get the result.

Press SEG. Again it will quit this segment input.

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Chapter 4 Data Analysis Software

All the test result data can be transferred to the PC through the USB port, the help pls see it on the management software on line help.

Chapter 5 Power

The instrument adopts rechargeable Li-battery, when the battery icon in the screen shines, and meanwhile the tester sends out sound, it means that the tester low battery.

The tester adopts intelligent charge management, when charge the tester, the charge indicator always shines. It will last for five hours when charge the tester.

Please notice that: don't use other chargers.

When charge the tester, users can't use the tester. When connect with the charger in start state, the tester will shut off automatically; and when charge the tester, users start the tester, the charge will stops automatically.

Chapter 6 Troubleshooting

6.1 Failure to Turn on the Power

Treatment: please recharge.

6.2 Sudden dead or mess display

Treatment: because of strong interference, power off and then power on.

For the other complex troubles, do not open the ST880 to try to settle that yourself instead of calling the sales service.

5.3 Contact

Please contact us as soon as possible if there is any problem about ST880, including this manual.

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